The Access Grid ?
Group to Group Collaboration on the Grid

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Stages of Collaboration

- Awareness
- Interaction
- Cooperation
- Collaboration
- Virtual Organization

Increasing desire for persistent collaborative environment

Persistent Shared Spaces enables the cost-effective virtual organizations.

The Access Grid

- Access Grid does for people what the computational Grid does for machines
- The Access Grid project focus is to enable *groups* of people to interact with Grid resources and to use the Grid technology to support group to group collaboration at a distance
  - Distributed Lectures and seminars
  - Remote participation in panel discussions
  - Virtual site visits meetings
  - Complex distributed grid based demonstrations

Access Grid Project Goals

- Enable Group-to-Group Interaction and Collaboration
  - Connecting People and Teams via the Grid
- Improve the User Experience: Go Beyond Teleconferencing
  - Provide a Sense of Presence
  - Support Natural Interaction Modalities
- Use Quality but Affordable Digital IP Based Audio/video
  - Leverage IP Open Source Tools
- Enable Complex Multisite Visual and Collaborative Experiences
  - Integrate With High-end Visualization Environments
  - ActiveMural, Powerwall, CAVE Family, Workbenches
- Build on Integrated Grid Services Architecture
  - Develop New Tools Specifically Support Group Collaboration

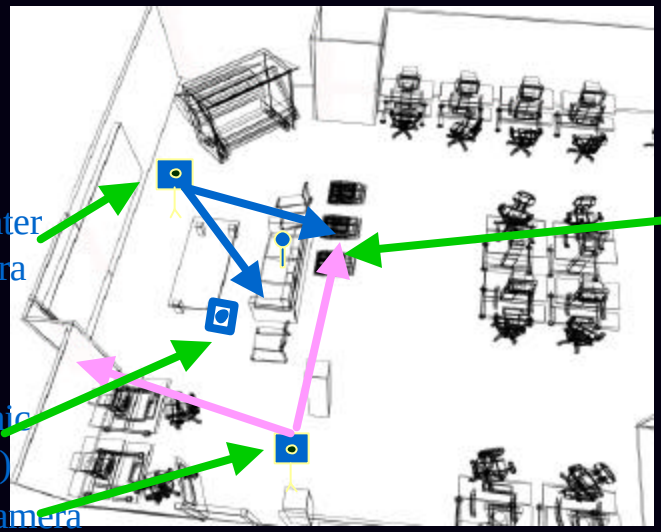
Some AG Definitions

The Access Grid: *The infrastructure and software technologies enabling linking together distributed Active(Work)Spaces to support highly distributed collaborations in science, engineering and education, integrated with and providing seamless access to the resources of the National Technology Grid.*

Access Grid Node: *The ensemble of systems and services managed and scheduled as a coherent unit (i.e. basic component of a virtual venue).*

Access Grid Site: *A physical site (admin domain, networking POP, etc.) that supports one or more Access Grid Nodes. Access Grid Sites need to be Grid services enabled (authentication, QoS, security, resource management, etc.)*

Access Grid Basics



- Designed spaces for group interactions
- Hands free audio
- Multiple Video and Audio streams
- Wide field of view

Access Grid Concepts (I)

- AG prototype Demonstration at UKY Chautauqua

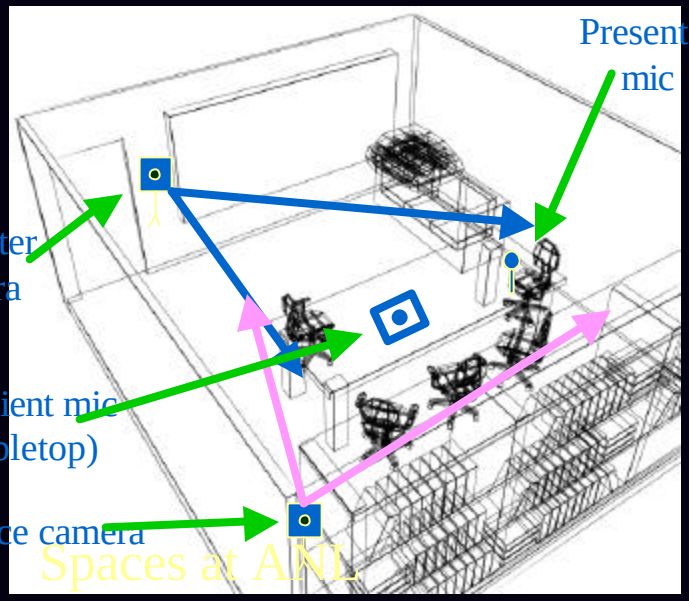
- Shared PowerPoint
- Large-format displays
- Multiple audio and video streams
- Supporting distributed meetings

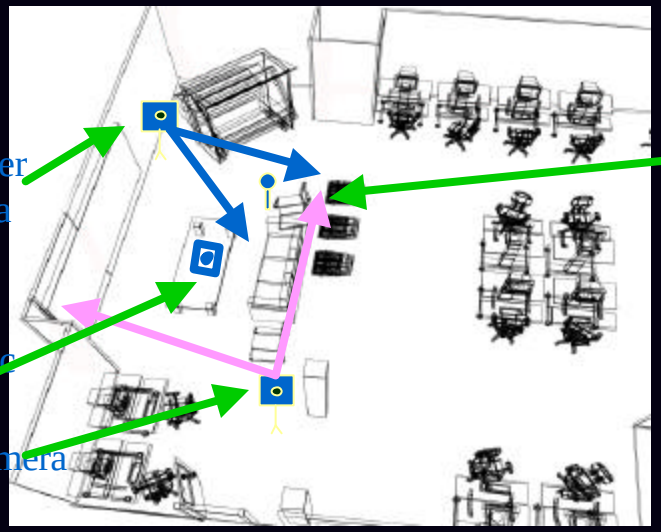
Access Grid Concepts

AG at the Chautauquas – A Panel Session

- Distributed PowerPoint
- Co-presence with remote groups
- Highest quality but affordable audio and video
- Multi-mode operation

Access Grid Concepts (II)





- Spaces at ANL
  - Library
  - Workshop
  - ActiveMural Room
  - DSL

Physical Spaces to Support Groupwork

- Overall room layout
  - large enough to support groups and workplace tools
  - configured so that both local and remote interactions work
- Lighting and camera geometry
  - studio type environment with specified placement, levels
  - well tested and calibrated for good image quality
- Audio geometry
  - multiple microphones and speakers
  - tested to provide good coverage
  - designed to support audio clarity and some spatialization

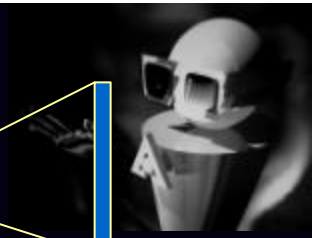
Virtual Collaboration Spaces

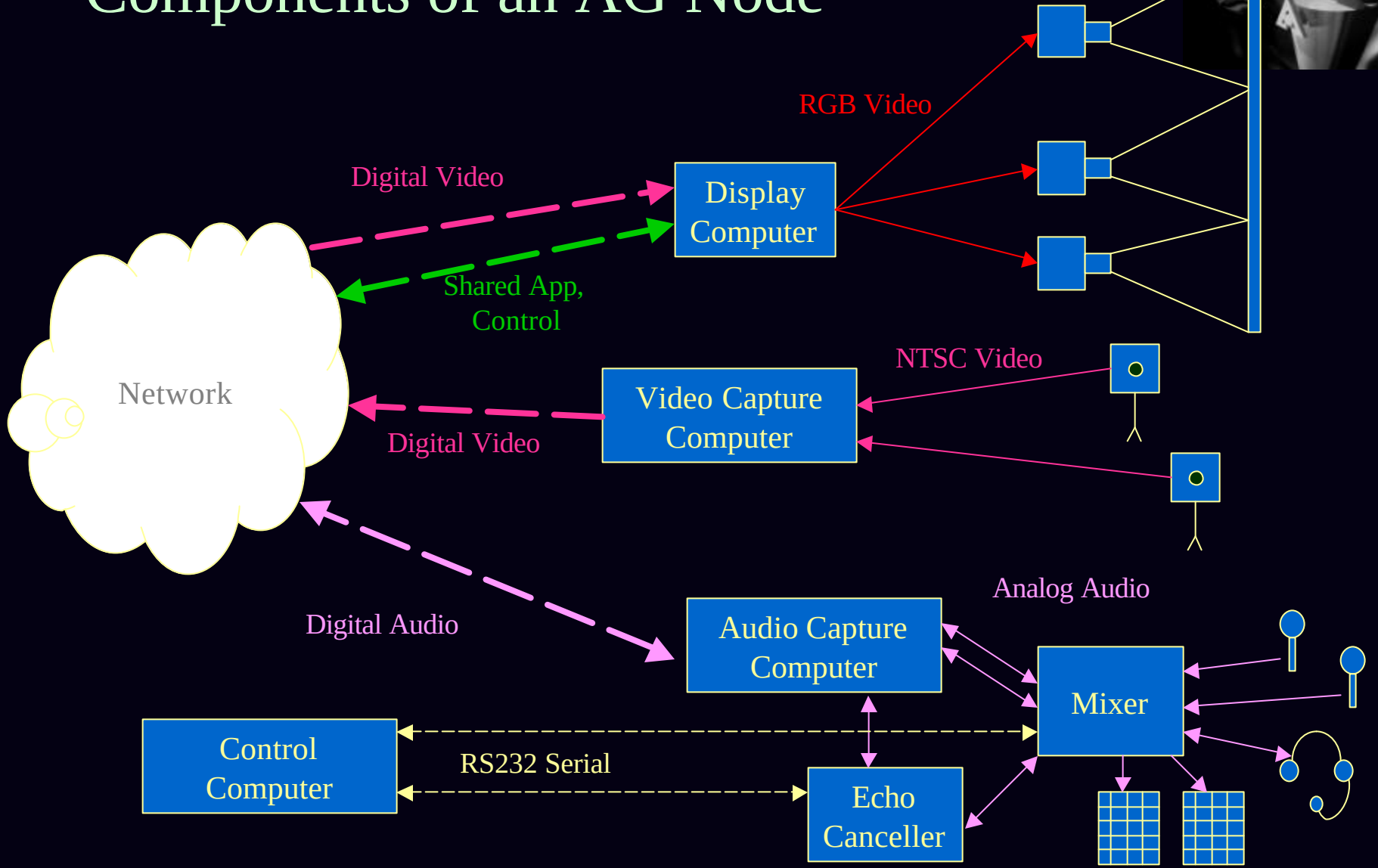
- Structure and organization supports intended use
  - activity dependent
    - secure channels for “private sessions”
    - broadcast channels for public meetings
- Supports multiple interaction types (modalities)
  - text, audio, video, graphics, animation, VR
- Can exploit strong spatial metaphor
  - interaction scoping
  - resource organization
  - navigation and discovery
- Needed to escape the tyranny of the desktop

Access Grid Capabilities today

- Display ? 3 commodity Projectors
- Video ? QCIF (½ NTSC) x ~20 streams
- Audio ? 16 bit mono/stereo ? multichannel
- Computing ? 4 PCs (partitioned by function)
- Software ? OS Video/Audio/Collaboration
- Network ? multicast enabled ~ 20 Mbit/s
- Production ? > 100 events in last year

Components of an AG Node





- Software, Production Issues

Equipment – PC's

- 4 PC's, minimum Pentium 2, 550MHz
  - Display Machine
    - 1 - Matrox G200-quad multiple display card
    - 1 – Matrox G400 dual head display card
    - Windows 2000
  - Audio Capture Machine
    - Linux
    - 2 or more - Soundblaster PCI 128 card
  - Video Capture Machine
    - Dual CPU
    - Linux
    - 4 – Hauppage WinTV PCI capture cards
  - Control machine
    - Win 98

Equipment - Sound

- Gentner AP400 or AP800 and AP10 Echo Cancel box
- Genelec speakers (2)
- Microphones – 4 or 8 Maximum on the Gentner
  - For table top use, Crown pcc 160
  - Wireless, Vega R22/T25
  - Room use – Crown PZM-30D
    - Can be noisy
  - Suspended condensor mic's (experimental)

Equipment - Cameras

Sony PC-Cam	http://www.picturephone.com/fp_sony1.htm
Videolabs FlexCam	http://www.picturephone.com/fp_vlab1.htm
Canon VC-C3 pan/tilt camera	http://www.picturephone.com/fp_cnon1.htm
Sony EVI-D30 pan/tilt camera	http://www.picturephone.com/fp_sony3.htm
Devserv	http://www-itg.lbl.gov/mbone/devserv/homepage.html

Projection Technology - Projectors

- Features to look for
  - LCD
  - small, light, bright (1000+ lumens)
  - Uniformity
  - Low cost - $ 3,500 - $5000
  - focus from 3.5’ to 38’
  - screen size from 24” to 300”
  - Quiet – fans can be noisy
- Some we use
  - Proxima 9250, 9250+
  - Epson 710c, 7500c
- Projector Mounts
  - Allow easy alignment
  - Sturdy

Software

- Windows 2000 Software
  - AG Virtual Venue Software Installation
  - Microsoft Office 2000
- Windows 98
  - Gentner Control Software
- Linux
  - Redhat 6.2
  - AG Software install script
    - Installs Video, audio capture, resource managers, etc

Argonne Ag Web Pages

- http://www.mcs.anl.gov/fl/accessgrid/

SC99

SC99

Globus Tutorial

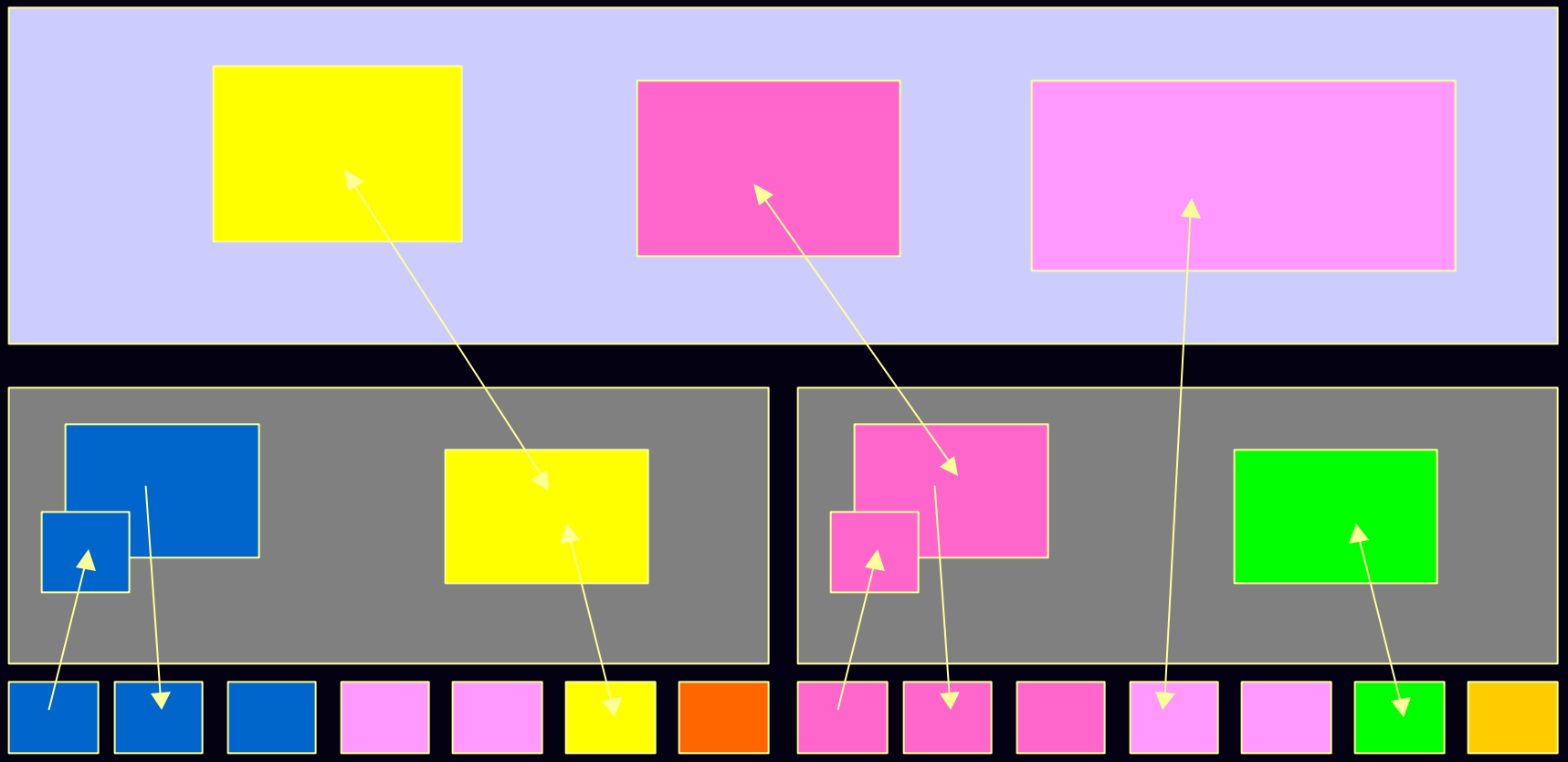
Access Grid at HPDC

Access Grid at HPDC

Access Grid Active Research Issues

- Models of scalable wide area communication
- Organization and scoping of resources
- Persistence of venues and resources
- Improving sense of presence and point of view
- Network monitoring and real-time management
- Role of Back-channel communications
- Recording and playback of multistream media

The Workspace Docking Concept



Private Workspaces - Docked into the Group Workspace

AG Sites – Current and Planned

- ANL (Several)
- NCSA (several)
- BU
- UNM
- UKy
- North Dakota State University
- EVL (visualization)
- Princeton
- LBL (Viz)
- LANL (Viz)
- OSC
- KU
- UofC CS Dept (planned)
- UofC Medical School (Planned)
- Brown Medical School (Planned)
- U of Alabama (Planned)
- UCDSD CS Dept (Planned)
- SDSC
- ACCESS DC
- Utah (2)(Viz)
- MHPCC
- Atlanta University Center (Planned)
- University of Arkansas (Planned)
- Motorola (Planned)
- UCAR (Planned)
- Lac Courte Oreilles Ojibwa Community College (Planned)
- Dine` College Navajo Nation

What We Have Learned So Far! (I)

- Critically Important to define a “standard” platform
  - defines minimum capability for software development
  - concrete definition of the AG node aids deployment and understanding
- Networking Infrastructure requires constant use to harden
  - concept of the nano-cruise helps sites harden infrastructure
  - need networking engineers in the loop constantly
- Training and Support needed to test in real world
  - Tutorials and online support have been critical to success of AG
- A Robust collaborative environment testbed is valuable
  - The cost to replace would be very high
- Exploration of New Ideas Requires Stable Testbed of non-trivial scale
  - can not be done simply in house or within single agency

What We Have Learned So Far! (II)

- CAVE-to-CAVE collaboration is interesting for specific applications but people do not want to spend all day in the CAVE
- Group oriented collaboration is about interaction not tools
- Group-to-group collaboration is more complex and demanding than person-to-person collaboration
- Creating compelling spaces is important to get people to try things in a low pressure environment (I.e. encourages constant use and experimentation)
- Using high-profile events is one fairly effective way to accelerate deployment of infrastructure but not for testing radically new technologies
- Nothing beats building something that people want to use for generating new ideas for things to try

Many Thanks to Our Research Collaborators

- Los Alamos (Ahrens, Painter, Reynders)
- Utah (Johnson, Hansen)
- Princeton (Li, Finkelstein, Funkhouser)
- UIUC (Reed, Brady)
- EVL/UIC (DeFanti, Leigh, Sandin, Brown)
- LCSE/Minnesota (Woodward)
- LBNL (Lucas, Lau, Johnston, Bethel)
- NCSA (Smarr, Catlett, Baker, Cox)
- Kitware (Schroeder, Lorensen)

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The AG Mud

MUD's

- A MUD is a Multi-user virtual environment.
- A MOO is an object oriented Multi-user environment

- Text based
- Persistent
- Capable of storing objects
- Searchable
- Recordable
- Client-server based
- Learn more at http://www.moo.mud.org/

- We use Lambda-Moo server with JHCore
- You pick a client (but we have some ideas about that)

The AGTech MOO – An example

JeffLong says, `we're getting ready to start'
JeffLong says, `we are running vnc btw'
ndsuag [to JeffLong]: I'm going to go sit in audience (or actually AS the audience) but am on operator backchannel... Marty
JeffLong says, `ok'
ndsuag lost net audio - probably our multicast problem - back now.
JeffLong says, `yeah, i see you as red'
ndsuag [to JeffLong]: I am still dialed into the gentner telco backup too so I won't need to reconnect to that if it gets too annoying.
`bruce is gonna look at your situation some more Marty,' says JeffLong.
JeffLong says, `not sure what to do, are you goings on rat? i don't see you'
KarenCamarda [to JeffLong]: Yep, we're on rat. We're hearing you, but it's osciallating between clear and tinny.
JeffLong says, `nod, i'm hearing that too on my 2ndary rat'
JeffLong says, "we had this problem yesterady with the lavaliere then it went away"
JeffLong says, "i think i'll have him turn it on/off after this talk, may be a cause"
`sounds like bad AM radio,' says JeffLong.
JeffLong says, "hey, on the gentern controller, i see when he speaks the levels rise under both input level and under normalized level"
`how high are those levels supposed to go?' asks JeffLong.
JeffLong says, `any ideas'

AGTech MOO – Getting started

- All necessary MOO software is installed by default on the display nmachine. To set up your own personal machine, use tkMoo-Light or client of your choice
- Get it at http://www.awns.com/tkMOO-light/
  - Install it according to the directions
- Configure tkMoo-Light so that you can work with us in Waterfall Glen (WFG):

1. Open connect->worlds
2. Click "new"
3. In the dialog popup enter the following
   - World: WFG (Or some other name you like)
   - Host: wfg.mcs.anl.gov
   - Port: 7779
   - User name: your character name
   - Password: your password
   - Short list: click this on
   - Connection script: connect %u %p
4. Click save
5. Click close

AGTech MOO - Connecting

- Entering Waterfall Glen:

1. Pull down the Connect menu and select WFG or whatever world name you entered .
2. tkMoo should connect you
3. If you're not already in the Access Grid Hangout Room type "go to access" in the command window.
4. Welcome to WFG!

AGTech MOO – Useful Commands

- @who in access
- help
- help some_topic
- help password
- password old_password new_password
- "hi there
- markh, Nice job with the AG Mud page.
- wa markh
- :bloats up like a penguin with indigestion.
- sm
- |http://www.mcs.anl.gov/fl/accessgrid/
- nd

AGTech MOO - Behavior

- Be kind.
- Be considerate.
- Don't be terribly vulgar.
- Don't be a pest.
- Work hard.
- Talk amongst yourselves.

AGTech MOO vs Access Grid Venues Mud

- The Access Grid Hangout room is a room on Waterfall Glen, the very large virtual community at Argonne. I call this the AGTech room because it is mostly members of the AGTech mailing list.

- The AG Venues Mud is a separate Mud entirely, not connected in any way to Waterfall Glen
- The Access Grid Venues Mud is the Access Grid Virtual Venue Mud server and is controlled by the Virtiual Venue server.

- The venues Mud is used during events. In off hours, many people use the Waterfall Glen Mud instead.

TKMoo-Light

WFGTerry - tkMOO-light

Connect Edit Tools Preferences Help

```
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2:34:55